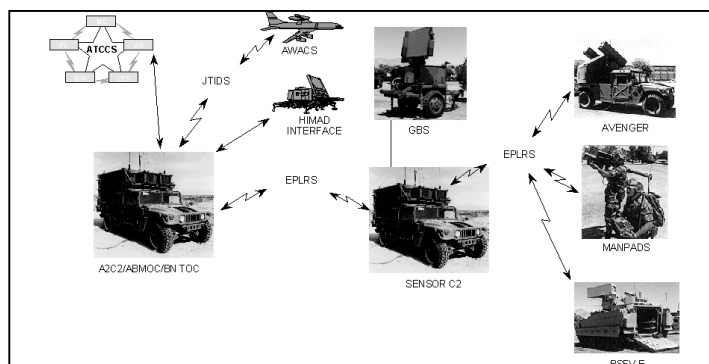# FORWARD AREA AIR DEFENSE COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE (FAAD C3I) SYSTEM

The Forward Area Air Defense Command, Control, Communications, and Intelligence (FAAD C3I) system is a network of components that connect command posts, weapons, and sensors of the Army's short-range air defense units. The Ground-Based Sensor (GBS), also called Sentinel, provides air surveillance, target acquisition, and target tracking information to the weapons in the FAAD Battalion. FAAD C3I is part of the Army Battle Command System. FAAD C3I consists of computer hardware, software and communications that provide command, control, targeting, and other information to air defenders on the battlefield, and provides a shared common air picture with the Air Force, Navy and the Patriot Missile System. FAAD C3I software performs air track and battle management processing functions and uses Single-Channel Ground and Airborne Radio System (SINCGARS), the Joint Tactical Information Distribution System (JTIDS), and the Enhanced Position Location Reporting System (EPLRS) for communications. The Sentinel TPQ-36A radar is a three-dimensional radar system using a phased-array antenna and an Identification Friend or Foe device. The GBS/Sentinel system is mounted on a High Mobility Multi-Purpose Wheeled Vehicle with a towed trailer.

BACKGROUND INFORMATION

The FAAD C3I and GBS IOT&E, conducted in 1994, clearly showed FAAD C3I and GBS demonstrated improved effectiveness over the baseline when no friendly aircraft were flying. However, when friendly aircraft were added to the operational scenario, fratricide in both the baseline and FAAD C3I units was unacceptably high. This made FAAD C3I useful only when friendly aircraft were not present or as a self-defense system. Further analysis by the Army found that many of the fratricide problems involved leadership, training and soldier performance issues as opposed to technical performance. The FAAD C3I and GBS systems were judged to be operationally suitable, except for shortfalls in the generator, GBS software reliability, and mobility.

A new version of FAAD C3I software, version 4.R, re-hosted the FAAD C3I software on the Army's next-generation Common Hardware and Software-2 hardware. The reliability problems noted in IOT&E were fixed and successfully tested during the 1997 Performance Verification Test. This test revealed a design flaw in the high mobility trailer used to transport the GBS system. The Army identified an interim solution and a materiel release was issued in November 1998.

The latest FAAD C3I system is version 5.2. The most significant change is the re-hosting of FAAD C3I software on Force XXI Battle Command, Brigade and Below (FBCB2) hardware. Specifically, the FBCB2 V4 computer displays either the FAAD C3I air defense picture or the FBCB2 ground picture. This requires FAAD C3I to transmit data over the same tactical internet network of EPLRS radios used by the FBCB2 V4 computer. The FBCB2 V4 computer also replaces the FAAD handheld terminal unit.

TEST & EVALUATION ACTIVITY

There was no formal operational testing of the FAAD C3I system during FY01. The Army conducted a System Certification Test during 3-4QFY01 in preparation for the Limited User Test (LUT) of FAAD C3I version 5.2 to be held in conjunction with the Patriot PAC-3 IOT&E, March 2002.

The Army Operational Test and Evaluation Command (ATEC) published an Interim System Assessment for the FAAD C3I System Block III software version 5.2 in October 2000. This assessment was based on FAAD participation in two FBCB2 test events – Field Test 2 (December 1999-March 2000) and the Customer Test (April 2000). These events constituted Phase I of the FAAD C3I version 5.2 System Assessment.

In FY01, the FAAD C3I system participated in the Army's Joint Contingency Force Advanced Warfighting Experiment, Division Capstone Exercise at Fort Irwin, California, and to a limited degree in the FBCB2 Field Test 4 at Fort Huachuca, Arizona. The Division Capstone Exercise, Phase I, was designed to certify the warfighting readiness of the Army's digital force, the 4th Infantry Division, at the brigade level. The event took place during a training rotation at the National Training Center. Data from all these events was limited to recording of digital message traffic and observations by Subject Matter Experts. The Army Test and Evaluation Command (ATEC) will use data from these events as part of their continuous evaluation of the FAAD system.

TEST & EVALUATION ASSESSMENT

The FAAD C3I and GBS systems have been shown to significantly enhance the accomplishment of low altitude, short-range air defense missions when compared to previous capability. The ability of STINGER-equipped units to engage hostile aircraft at longer ranges, particularly before threat aircraft ordnance release, offers greatly improved protection of friendly ground units. However at longer ranges, positive identification of unknown aircraft is more difficult, and fratricide, first observed during the 1994 IOT&E, continues to be a serious problem for the combined ADA force (Patriot, Marine Corps SHORAD weapons/crews and FAAD C3I/Sentinel). The inability of electronic identification devices to correctly identify all friendly aircraft requires soldiers to visually identify all unknown aircraft as either friend or foe. For example, during the 2000 All Service Combat Identification Evaluation Test, there were several instances of fratricide by the combined short-range air defense units operating with FAAD C3I.

The FAAD C3I LUT in 2002 re-examines fratricide issues and also addresses several new issues that relate to the use of the FBCB2 V4 computer. The Tactics, Techniques, and Procedures for operating the FAAD C3I system on the FBCB2 computer need to be developed. There have been operational shortfalls in the air defense mission due to frequent failures and reboots of the FBCB2 Applique+ Version 3 computer. The reboot time has taken up to six minutes at ambient temperatures, and longer at

higher temperatures. The current version of the FBCB2 computer, version 4, appears to have resolved the failure/reboot issues as seen in recent events.

Another developing issue is the capability of the tactical internet to support the movement of information within an Army division in a timely manner. In past events, the size of the tactical internet appears to interfere with getting air track information from the FAAD sensors to the FAAD shooters. During the Division Capstone Exercise 1 exercise in 2001, the overall message completion rate was approximately 50 percent. During the FBCB2 Field Test 3 in FY00, where only a slice of the network was present, there was no significant degradation in message completion rates. The FY02 FAAD C3I LUT has a communications network of only 20 EPLRS radios not making it impossible to resolve this issue. The FAAD evaluation community is aware of the communications network issue and is looking at alternative sources of data such as the FBCB2 Field Test 4 and the FBCB2 IOT&E to help address this issue.

The FAAD C3I and GBS LUT in FY02 examines the effectiveness and suitability of version 5.2 software, and will address fratricide by employing both friendly and hostile aircraft. In the Army's new integrated, networked command and control environment, it is critical that the impact of network loading be tested and evaluated as early as possible and always in operational testing. The development of a realistic command, control, and communications driver is critical for providing an adequate and realistic operational environment for testing.

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